

Utilization of Municipal Bulky Plastics and Wood Wastes in Industrial Manufacturing of Wood Plastic Composites

D. Basalp¹, F.Tihminlioglu¹, A. Sofuoglu¹, S.C. Sofuoglu², F. Inal¹

¹Department of Chemical Engineering, İzmir Institute of Technology, İzmir, 35430, Turkey

²Department of Environmental Engineering, İzmir Institute of Technology, İzmir, 35430, Turkey

Keywords: Plastic recycling, urban waste, WPC manufacturing, sustainability.

Presenting author email: aysunsofuoglu@iyte.edu.tr

In the scope of this study, wood plastics composites (WPCs) were produced from bulky recycled plastics and wood wastes to reduce the environmental effects of plastics, reserve natural resources and support circular economy for sustainable production and consumption. The usage of waste as a resource is one of the goals for the realization of the close-loop economic option and sustainability according to greening strategy in the European community (Malinauskaite et al.2017). Most of the plastic wastes are naturally non-biodegradable. Reutilization of plastics wastes leads to the reduction of the environmental effects, dependency of petroleum resources and promote ecosystem (Goswami and Sarma 2008). There are many studies about the reusability of plastic waste in various applications from the production of fuel to cement (Kunwar et al. 2016, Sharma and Bansal 2016).

In this study, the production of WPCs from urban bulky waste was selected due to their extensive applications. WPCs were prepared at different compositions (wood flour, anti-oxidants, UV stabilizers and coupling agents) for the determination of optimum concentrations. The mechanical tests of the WPCs were carried out to check the required properties for WPC applications. The optimum compositions of wood and other additives in WPC were determined in laboratory scale before industrial applications. Industrial manufacturing of WPC products by using bulky wastes were done in injection molding machines by considering optimum compositions. Crates and table legs from recycled plastic and wood waste were produced in the industrial scale. Manufacturing of crates and table legs indicates the applicability of WPCs from recycled plastics in transport and furniture sector, respectively. Also, many alternative WPC products for requisites and demands of consumers can be manufactured from municipal plastics waste. As a result of this study, the industrial manufacturing capability of WPC products from municipal plastics waste was shown for different applications.

Acknowledgements

URBANREC project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 690103.

References

- Goswami U., Sarma H.P., "Plastic waste pollution and management - An overview(Review)", Ecology, Environment and Conservation,14, 1, 25-28, 2008.
- Kunwar, Bidhya; Cheng, H. N.; Chandrashekar, Sriram R.; KSharma, B., "Plastics to fuel: a review", Renewable and Sustainable Energy Reviews, 54 , 421-428, 2016
- Malinauskaite J. , Jouhara H., Czajczynska D., Stanchev P., Katsou E., Rostkowski P., Thorne R.J., Colon J., Ponsa S., Al-Mansour F., Anguilano L., Krzyzyska R., Lopez I.C., Vlasopoulos A., Spencer N. "Municipal solid waste management and waste-to-energy in the context of a circular economy and energy recycling in Europe", Energy, 141, 2013-2044, 2017.
- Sharma, R., Bansal, P.P., "Use of different forms of waste plastic in concrete - a review", Journal of Cleaner Production, 112, 473-482, 2016.